CLAIMS

1. A method for managing the transmission of information packets on channels of a telecommunications network, characterised in that it comprises the steps of:

- arranging said packets into user queues received in respective buffers, by measuring the occupancy level of said buffers,
- sorting said users into respective classes (RT, NRT) identified by the service modes requested by said users,
- measuring the propagation conditions on the transmission channel respectively associated to said users, and
- determining the priority in the transmission of said packets, by choosing the order in which said respective queues are visited as a function of:
  - a first level priority, linked to whether said users belong to said respective classes (RT, NRT),
  - a second level priority, linked to at least a parameter chosen between the occupancy level of the respective buffer and the propagation conditions of said respective channel.

2. A method as claimed in claim 1, characterised in that among the users with the same first level of priority, the user with the highest buffer occupancy is chosen.

3. A method as claimed in claim 2, characterised in that, for equal buffer occupancy, the user demonstrating the best channel propagation conditions is chosen.

4. A method as claimed in claim 1, characterised in that among the users with the same first level

priority, the user demonstrating the best channel propagation conditions is chosen.

5. A method as claimed in claim 4, characterised in that, for equal channel propagation conditions, the user with the highest buffer occupancy is chosen.

6. A method as claimed in any of the claims from 1 to 5, characterised in that it comprises the step of dividing said users into:

- at least a first class (RT), comprising users who require conversational or streaming services, and
- at least a second class (NRT), comprising users who require interactive or background services.

7. A method as claimed in any of the previous claims, characterised in that it comprises the step of:

- determining the transmission capacity available for the transmission of said packets, by identifying a negotiated peak transmission rate value,
- trying to assign to the highest priority user the transport format corresponding to said peak rate, by transmitting the related queued packets in case of positive outcome of said assignment,
- in case of negative outcome of said assignment, trying to allocate to said highest priority user the next highest transport format, said attempts with lower format being continued until the allocated rate falls within the available capacity.

8. A method as claimed in claim 7, characterised in that it comprises, after transmitting the information packets associated to said highest priority user, the step of detecting any available residual transmission capacity and the step of repeating the previous steps for said higher priority user, for the user with the next highest priority, until there are no more said transmission resources or active users.

9. A method as claimed in any of the previous claims, applied to a transmission network organised in respective cells in which said transmission resources are shared with real time services which are given top priority, characterised in that it comprises the step of estimating the residual capacity of the respective cell left free by said real time services available for the transmission of said information packets.

10. A method as claimed in any of the previous claims, characterised in that it comprises an access control (AC) function configured to allow entry into the system to users with information packets to be transmitted; the access being conducted, for at least some (NRT) of said users by evaluating exclusively the possibility for said users to transmit their information packets with the minimum rate prescribed by the set of transport formats of the network.

11. A method as claimed in claim 1 or claim 10, characterised in that a packet scheduling function (PS) is provided, configured to verify that at least some (NRT) of said users transmit without congesting the radio interface, by controlling and setting, on a case by case basis, the rate of the respective dedicated connection in order not to exceed a given limit imposed by the characteristics of said network.

12. A method as claimed in any of the previous claims, characterised in that it comprises the step of organising the transmission of said information packets by means of a state machine which allows:

- a first state (102) corresponding to the recognition of the fact that information packets are present in at least one of said respective buffers,
- a second state (104) corresponding to the transmission of said information packets by means of corresponding transmission resources, and

- a suspended state (106) corresponding to the recognition of the unavailability of resources for the transmission of said information packets with the conservation of said transmission channel, said state machine being capable of evolving anew from said third state (106) to said second state (104) without dropping said transmission channel, when said transmission resources become available again.

13. A method for managing the transmission of information packets on a communication network organised in cells, in which said information packets can be selectively transmitted, within said cells, both on a shared channel (RACH/FACH) and on a dedicated channel (DCH), comprising the steps of:

- transmitting the information packets of a determined user on said shared channel (RACH/FACH) or on a respective dedicated channel (DCH) as a function of a related traffic volume,

- defining at least one threshold (T1, T2) of traffic level, determining the switching of the transmission of the information packets of said determined user on said dedicated channel (DCH) starting from said shared channel (RACH/FACH) when the related traffic level grows reaching said at least one threshold (T1, T2) and determining the switching of the transmission of the information packets of said determined user on said shared channel (RACH/FACH) starting from said dedicated channel (DCH) when said respective traffic volume drops reaching said at least one threshold (T1, T2), characterised in that it comprises the step of selectively varying the level of said at least one threshold (T1, T2).

14. A method as claimed in claim 13, characterised in that it comprises the step of: reducing said at least one threshold in conditions of reduced traffic in

order to favour the use of said dedicated channel (DCH), thereby assuring a better quality of service.

15. A method as claimed in claim 13 or claim 14, characterised in that it comprises the step of: raising said at least one threshold, making more difficult the switch to said dedicated channel (DCH) starting from said shared channel (RACH/FACH), under alarmed operating conditions of said network.

16. A method as claimed in any of the previous claims 13 to 15, characterised in that it comprises the step of: detecting a state of approaching congestion of said network and the step of: inhibiting the switching to said dedicated channel (DCH) starting from said shared channel (RACH/FACH) under said near-congestion conditions.

17. A method as claimed in any of the previous claims 13 to 16, characterised in that it comprises the step of: measuring the propagation conditions on the transmission channel respectively associated to said determined user as dedicated channel (DCH) and the step of determining the switching of the transmission of the information packets of said determined user on said shared channel (RACH/FACH) starting from said dedicated channel (DCH) in the presence of a degradation of said propagation conditions below a threshold value.

18. A method as claimed in claim 17, characterised in that said switching on said shared channel (RACH/FACH) starting from said dedicated channel (DCH) is determined as a function of the signal/interference ratio (SIR).

19. A method as claimed in claim 18, characterised in that said switching to said shared channel (RACH/FACH) starting from said dedicated channel (DCH) is determined based on the difference between the

measured value determined when the measured value ($SIR_{measured}$) and the target value (SIR_{target}) of the signal/interference ratio (SIR) reaching a selectively determined threshold value (a).

20. A system for managing the transmission of information packets on channels of a telecommunications network, characterised in that it comprises:

- a plurality of respective buffers configured to receive said packets in user queues; said users being sorted into respective classes (RT, NRT) identified by the service modes requested by said users,
- detector modules (CM, DM) able to measure the propagation conditions on the transmission channel respectively associated to said users, and
- a module for managing packet scheduling (PS) configured to determine the priority in the transmission of said packets, by choosing the order in which said respective queues are visited as a function of:
  - a first level priority, linked to whether said users belong to said respective classes (RT, NRT),
  - a second level priority, linked to at least a parameter chosen among the occupancy level of the respective buffer and the propagation conditions of said respective channel.

21. A system as claimed in claim 20, characterised in that said module for managing packet scheduling (PS) is configured to choose, among the users with the same first level priority, the user who has the highest buffer occupancy.

22. A system as claimed in claim 21, characterised in that said module for managing packet scheduling (PS) is configured to choose, for equal buffer occupancy

values, the user who demonstrates the best channel propagation conditions.

23. A system as claimed in claim 20, characterised in that said module for managing packet scheduling (PS) is configured to choose, among the users with the same first level priority, the user who demonstrates the best channel propagation conditions.

24. A system as claimed in claim 23, characterised in that said module for managing packet scheduling (PS) is configured to choose, for equal channel propagation conditions, the user who has the highest buffer occupancy.

25. A system as claimed in any of the claims 20 to 24, characterised in that said module for managing packet scheduling (PS) is configured to:

- determine the transmission capacity available for the transmission of said packets, by identifying a negotiation peak transmission rate value,

- try to assign to the highest priority user the transport format corresponding to said peak rate, by transmitting the related queued packets in case of positive outcome of said assignment,

- in case of negative outcome of said assignment, try to allocate to said highest priority user the next highest transport format, said attempts with lower format being continued until the allocated rate falls within available capacity.

26. A system as claimed in claim 25, characterised in that said module for managing packet scheduling (PS) is configured to detect, after transmitting the information packets associated to said highest priority user, any available residual transmission capacity and to repeat the operations carried out for said highest priority user until there are no more said transmission capacity or active users.

27. A system as claimed in any of the previous claims 20 to 26, associated to a transmission network organised in respective cells having a determined transmission capacity shared with real time services whereto is assigned the highest priority, characterised in that said module for managing packet scheduling (PS) is configured to estimate a residual capacity of the respective cell left free by said real time services available for the transmission of said information packets.

28. A system as claimed in any of the previous claims 20 to 27, characterised in that it comprises an access control module (AC) configured to allow users with information packets to be transmitted to enter the system; the access being conducted, for at least some (NRT) of said users by evaluating exclusively the possibility for said users to transmit their information packets with the minimum rate prescribed by the set of transport formats of the network.

29. A system as claimed in claim 20 or claim 28, characterised in that said module for managing packet scheduling (PS) is configured to verify that at least some (NRT) of said users transmit without congesting the radio interface, controlling and setting on a case by case basis the rate of the respective dedicated connection in order not to exceed a given limit imposed by the characteristics of said network.

30. A system as claimed in any of the previous claims 20 to 29, characterised in that it comprises a state machine which allows:

- a first state (102) corresponding to the recognition of the fact that information packets are present in at least one of said respective buffers,

- a second state (104) corresponding to the transmission of said information packets by means of corresponding transmission resources, and

- a suspended state (106) corresponding to the recognition of the unavailability of resources for the transmission of said information packets with the conservation of said transmission channel, said state machine being capable of evolving anew from said third state (106) to said second state (104) without dropping said transmission channel, when said transmission resources become available again.

31. System for managing the transmission of information packets on a communication network organised in cells, in which said information packets can be selectively transmitted, within said cells, both on a shared channel (RACH/FACH) and on a dedicated channel (DCH), comprising a module for managing packet scheduling (PS) configured to:

- transmit the information packets of a determined user on said shared channel (RACH/FACH) or on a respective dedicated channel (DCH) as a function of a related traffic volume,

- define at least one threshold (T1, T2) of traffic level, determining the switching of the transmission of the information packets of said determined user on said dedicated channel (DCH) starting from said shared channel (RACH/FACH) when the related traffic level grows reaching said at least one threshold (T1, T2) and determine the switching of the transmission of the information packets of said determined user on said shared channel (RACH/FACH) starting from said dedicated channel (DCH) when said respective traffic volume drops reaching said at least one threshold (T1, T2), characterised in that said module for managing packet

scheduling (PS) is configured selectively to vary the level of said at least one threshold (T1, T2).

32. A system as claimed in claim 31, characterised in that said module for managing packet scheduling (PS) is configured to reduce said at least one threshold under reduced load conditions in order to favour the use of said dedicated channel (DCH), thereby assuring a better quality of service.

33. A system as claimed in claim 31 or claim 32, characterised in that said module for managing packet scheduling (PS) is configured to raise said at least one threshold, making more difficult the switching towards said dedicated channel (DCH) starting from said shared channel (RACH/FACH) under alarmed operating conditions of said network.

34. A method as claimed in any of the previous claims 31 to 33, characterised in that said module for managing packet scheduling (PS) is made sensitive to a state of approaching congestion of said network and is configured to inhibit the switching to said dedicated channel (DCH) starting from said shared channel (RACH/FACH), under said conditions of near congestion.

35. A system as claimed in any of the previous claims 31 to 34, characterised in that it comprises at least one detector module (CM, DM) capable of detecting the propagation conditions on the transmission channel respectively associated to said user as dedicated channel (DCH) and said module for managing packet scheduling (PS) is configured to determine the switching of the transmission of the information packets of said determined user on said shared channel (RACH/FACH) starting from said dedicated channel (DCH) in the presence of degradation of said propagation conditions below a threshold value.

36. A system as claimed in claim 35, characterised in that said module for managing packet scheduling (PS) is configured to determine said switching on said shared channel (RACH/FACH) starting from said dedicated channel (DCH) as a function of the signal/interference ratio (SIR) detected by said at least one detector module.

37. A system as claimed in claim 36, characterised in that said module for managing packet scheduling (PS) is configured to determine said switching on said shared channel (RACH/FACH) starting from said dedicated channel (DCH) based on the difference between the measured value ($SIR_{measured}$) and the target value (SIR_{target}) of the signal/interference ratio (SIR) reaching a selectively determined threshold value (a).

38. Computer program product able to be loaded directly into the memory of at least one digital computer and comprising portions of software code to implement the steps of the method as claimed in any of the claims from 1 to 19 when the computer product is executed on at least one digital computer.